

TEMPLE UNIVERSITY  
Department of Mathematics

# Applied Mathematics and Scientific Computing Seminar

Room 617 Wachman Hall

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## The Mathematics of Swarms and Swarm Intelligence

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### **Abstract.**

A swarm is a collection of individuals that interact with each other and the environment. Examples inspired from the natural world are ant colonies, schools of fish and crowds of people. Together, the group is more capable of finding food or other resources, identifying threats and solving other problems than the individual constituents. In other words, these groups are more fit than the individuals within each group. Furthermore, the swarm solves complex problems without central control. On other scientific frontiers, we live in an increasingly complex technological environment where autonomous devices such as sensors, vehicles and robots will need to communicate with one another to solve contemporary problems. Swarm intelligence is a very broad field involving scientists, engineers and mathematicians with the latter playing a key role. Mathematics is one of the few disciplines that can transcend design and simulation to provide the community with robust insights into the mapping between local swarm interactions, mathematical structures and global swarm behavior. In this talk, I will survey some problems and results associated with different kinds of swarms.